

Prediction of Stock Turnover Trend Based on ARIMA Model

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Abstract

In 1990, when the Shanghai Stock Exchange was established, my country's stock market began to develop. In the past 27 years, my country's stock market has made great progress. More and more investors have begun to pay attention to the stock market. Entering the stock market, stock investment has become very common. An investment method, the rise and fall of the stock market affects the hearts of every investor. Out of curiosity about the stock market, I would like to analyze the trend changes of my country's stock turnover during the 18 years from 1992 to 2009, and to study and explore its main influencing factors. From the conclusion, I found that the change of stock turnover is closely related to the price of gold and the Shanghai Composite Index. Based on the analysis of this report, investors can make reasonable investments by estimating changes in stock turnover based on recent changes in gold prices and the trend of the Shanghai Composite Index.

Keywords

ARIMA model; Stock turnover.

1. Introduction

1.1. Research Background

1.1.1. Chinese Stock Market

China's stock market is sometimes referred to as China's stock market. It was established as a pilot project in 1989, based on the concept of going up if it goes well and stopping if it doesn't work out. Therefore, in the operation of the stock market before 1995, the biggest negative news was usually the news that China's stock market pilots would stop and the stock market would close.

Affected by the "8.23 treasury bond futures incident", China's futures market underwent a comprehensive rectification in 1995.

The domestic stock market has become the object of support, so that the stock market has ushered in real benefits and has entered a period of great development.

The biggest feature of China's stock market is that state-owned shares and legal person shares promise not to be circulated when they are listed. Therefore, only the tradable shares of each stock are traded according to the stock price in the market. However, the index is weighted according to the total share capital. "specialty. For example, before 1997, Northeast Electric Power and Jilin Chemical Co., Ltd. were notable. Due to their large total share capital and small number of tradable shares, only a small amount of capital was used to affect these two stocks, which could form part of the control over the index.

After 2001, the China Securities Regulatory Commission gradually proposed to solve the problem of non-tradable state-owned shares and to revitalize the state-owned shares.

Assets, has successively introduced some programs. However, due to the initial listing and issuance process, the circulating shareholders traded at a super high price-earnings ratio.

The tradable shares were purchased, and these plans have more or less harmed the interests of tradable shareholders, so the market took the lead.

Xiong Er made a market reaction to the reform of "reduction of state-owned shares". Later, under pressure from the market, the China Securities Regulatory Commission announced the suspension of the "National

There are shareholding reduction reforms.

However, in 2005, the China Securities Regulatory Commission once again proposed the "share-trading reform", the essence of which is still the reduction of state-owned shares.

The difference is that this reform aims to eliminate the separation of shares, and even the circulation of legal person shares is included.

Great disapproval from the market. In January 2007, the market capitalization of Shanghai and Shenzhen exceeded 10 trillion yuan. In April, the market value jumped to 16 trillion yuan. In August, it surged to 23 trillion yuan. many. The end of 2007 will go down in history with the extraordinary and permanent record of China's capital market! However, under the influence of the global financial crisis caused by the subprime mortgage crisis in the United States in 2008, China's stock market has also undergone a sudden change, and it has fallen sharply from a high of more than 6,000 points to more than 1,600 points in a year. In 2010, the launch of financial innovation margin financing and securities lending and margin financing business made it a history to only do long and not short in the stock market, which is a milestone in the development of China's stock market.

1.1.2. Stock Index Futures Coming Soon

From the perspective of the international and domestic situation, the opening of stock index futures is the general trend. It is very likely that my country will launch stock index futures in the near future. The theoretical research and exploration of stock index futures has become a topic of great practical significance in China's financial research. Since my country has not yet launched stock index futures trading, the research on stock index futures market is still relatively weak, especially lack of systematic research on stock index futures theory and empirical research on stock index futures market.

The full name of stock index futures is stock price index futures, also known as stock price index futures, which refer to standardized futures contracts with stock price indices as the subject matter. , to trade the underlying index. As a type of futures trading, stock index futures trading has basically the same characteristics and processes as ordinary commodity futures trading.

The stock price index is used to reflect the overall level of various stock market prices and their changes in the entire market.

condition indicator. In the stock market, hundreds of stocks are traded at the same time, and the stock price rises and falls differently, so

There needs to be a general standard, the stock price index, to measure the price level of the entire market, observe the stock market

changes.

Features of stock index futures:

(1) Intertemporality. Stock index futures are contracts in which both parties agree to trade according to certain conditions at a certain time in the future by predicting the changing trend of the stock index. Therefore, the trading of stock index futures is based on future expectations, and the accuracy of the expectations directly determines the profit and loss of investors.

(2) Leverage. Stock index futures trading does not need to pay the full amount of the contract value, but only needs to pay a certain percentage of the margin to sign a larger value contract. For example, assuming that the margin for stock index futures trading is 10%, investors only need to pay 10% of the contract value to trade. In this way, investors can control 10 times the

contracted assets of the invested amount. Of course, while the gains may be multiplied, the losses that investors may bear are also multiplied.

(3) Linkage. The price of stock index futures is closely related to the movement of its underlying asset, the stock index. The stock index is the underlying asset of stock index futures and has a great influence on the price changes of stock index futures. At the same time, stock index futures are expectations for future prices, so they also have a certain guiding effect on stock indexes.

(4) High risk and risk diversity. The leverage of stock index futures determines that it has a higher risk than the stock market. In addition, stock index futures also have specific market risks, operational risks, cash flow risks and so on.

1.1.3. The Launch of Margin Financing and Securities Lending

From March 31st, the pilot program of margin financing and securities lending was officially launched. Analysts pointed out that overseas experience shows that the launch of margin financing and securities lending will increase market volatility in the short term, but it may have a positive impact on the A-share market. The launch of margin financing and securities lending business is good for the A-share market in the short term, and also has a positive impact on the trend of A-shares. It is estimated that the stock index may shift its focus in the short term. "The empirical research of Zhao Xu, an analyst at Northeast Securities, shows that margin trading and securities lending have a positive effect on the stock market's trading volume, and have a more obvious effect on increasing the liquidity of the stock market and active trading.

1.1.4. IPOs Are Rapidly Increasing, with A-Share Ipos Raising More Than 100 Billion Yuan in the First Quarter

According to statistics, in the first quarter, the amount of direct financing in the market reached 522.2 billion yuan, and equity financing and debt financing reached 1,582 billion yuan respectively.

100 million yuan and 364 billion yuan. In the equity financing, a total of 89 companies successfully implemented IPOs, and the actual raised funds were 113.3 billion

Yuan, an increase of 17% over the fourth quarter of last year. It is worth mentioning that IPOs became the biggest attraction in the financial market in the first quarter. A total of 89 companies completed IPOs in the A-share market. The actual amount of funds raised was 113.3 billion yuan. The number of IPOs and the actual amount of funds raised both exceeded the previous quarter. Statistics show that in the fourth quarter of 2009, a total of 72 companies completed IPOs, and the actual raised funds were 96.549 billion yuan. Among the 89 new shares, 56 companies were listed on the SME board, with an actual financing amount of 44.44 billion yuan; 24 companies were listed on the ChiNext, with an actual financing amount of 16.23 billion yuan. The number of new shares issued on the main board was the least. Only 5 companies were listed in the first quarter, but the funds raised reached 52.64 billion yuan, accounting for 46% of the total amount of IPO funds raised. In terms of issuance scale, the number of IPOs in the first quarter and the actual amount of funds raised have greatly exceeded the level of the fourth quarter of last year, and the trend of IPO issuance has gradually accelerated. In fact, since June 19, 2009, Guilin Sanjin became the first IPO to restart, and the number of newly listed stocks has approached 200. As of yesterday, after deducting the separate listing of Northeast Expressway into Longjiang Transportation and Jilin Expressway, the number of IPOs in Shanghai and Shenzhen has reached 195, and the actual raised funds are 308.55 billion yuan. With the continuous increase in the number of issuances, new shares and sub-new shares have gradually grown into a large-scale and important sector in the A-share market.

Judging from the first quarter just past, the increase in the new shares and new shares sector is indeed quite amazing. Statistics show that as of yesterday, the average increase of nearly 90 newly listed stocks in the first quarter was as high as 58%, far outperforming the -5.13% increase of the Shanghai Composite Index in the first quarter. Only two stocks closed down,

namely China First Heavy Industries, which was listed on February 9, and China Chemical, which was listed on January 7. The latest declines were 1.93% and 5.16%, respectively. Among the new stocks that completed IPOs in the first quarter, a total of 11 stocks doubled. They are Hanwang Technology, Zhangyuan Tungsten Industry, GEM, Kemian Wood Industry, Aopu Optoelectronics, Xianju Pharmaceutical, Dongfang Fortune, Zhongheng Electric, Xinbeiyang, Qixing Electronics and Keyuan Co., Ltd. Among them, Hanwang Technology, which was listed on March 3, outperformed the pack with an increase of 180%.

1.2. Research Methods

stock turnover and the related factors that affect stock turnover by using the method of empirical analysis and literature research. The research is carried out from the perspective of multiple linear regression model and nonlinear regression model. In the fitting process of the multiple linear regression model, the analysis of the correlation between the sample data, the test of the coefficient and the significance of the model (t test, F test), the analysis and test of the multicollinearity after the initial model establishment, and the application of step-by-step The regression method realizes the elimination of multicollinearity in the model, so as to revise and improve the model. In the establishment of nonlinear regression model, it involves establishing the nonlinear relationship between bond turnover and various influencing factors through scatter plot and fitting effect analysis, and testing the significance of coefficients and models (t test, F test), using the stepwise regression method to select elements and other methods to achieve the optimization of the model. Finally, the established multivariate linear model is compared with the nonlinear model, and the model with the best fitting effect is selected, and the residual test method is used to analyze the validity of the model and the fitting effect of the data, so as to ensure the model's validity. Practicality, the model can be used for predictive analysis and final conclusions can be drawn.

1.3. Research Purpose

With the establishment of the Shanghai Stock Exchange, my country's stock market has gradually developed. New investors are constantly entering the stock market. In recent years, China's stock market has been surging. How to invest and how to estimate the stock turnover is also one of the focuses of everyone's attention. The purpose of this report is to explore the changing trend of stock turnover, find its main influencing factors, and analyze it.

1.4. Introduction to Theory

1.4.1. Correlation Analysis

Correlation analysis refers to the analysis of two or more variables to measure the closeness of the relationship between the variables. The commonly used calculation index is the correlation coefficient. Assuming that there is a variable x and the corresponding binary data are (x1, y1), (x2, y2)...(xn, yn), the calculation formula of the correlation coefficient is as follows:

$$r_{xy} = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}}$$

$$\text{in. } \bar{x} = \frac{x_1 + x_2 + \dots + x_n}{n}, \quad \bar{y} = \frac{y_1 + y_2 + \dots + y_n}{n}.$$

The value of the calculated correlation coefficient is between -1 and 1, and the meaning is as follows:

- ① The correlation coefficient is 0, and there is no linear relationship between x and y
- ② The correlation coefficient is between 0 and 1, and the variables are positively correlated;

③ The correlation coefficient is between -1 and 0, and the variables are negatively correlated. In addition, the larger the absolute value of the correlation coefficient, the stronger the correlation. Generally, if the absolute value of the correlation coefficient is between 0 and 0.2, the variables are very weakly correlated or have no linear correlation. If the absolute value of the correlation coefficient is between 0.2 and 0.4, there is a weak correlation between the variables, and the absolute value of the correlation coefficient is 0.4. Between -0.6, there is a moderate correlation between variables, between 0.6 and 0.8, the absolute value of the correlation coefficient is between 0.6 and 0.8, there is a strong correlation between variables, and between 0.8 and 1.0, the absolute value of the correlation coefficient is between variables. Strong correlation.

(2) Multiple linear regression model

A multiple linear regression model refers to a linear regression model that contains two or more explanatory variables. The general form is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \varepsilon, \quad (n \geq 2)$$

Among them, n is the number of independent variables, $\beta_0, \beta_1, \beta_2, \dots, \beta_n$ is the regression coefficient, y is the dependent variable, also known as the explained variable, x_1, x_2, \dots, x_n are n variables that can be accurately measured, called Independent variable or explanatory variable, ε is random error.

2. Data Collection and Related Instructions

Table 1. The data analysis between 1992 and 2009.

	Shanghai Composite Index (closing price)	Stock turnover (100 million yuan)	RMB exchange rate (annual average price)	Gold Price (USD/oz)
1992	780.39	683	551.46	343.95
1993	833.8	3627	576.2	359.82
1994	647.87	8128	861.87	384.15
1995	555.29	4036	835.1	384.05
1996	917.02	21332	831.42	387.87
1997	1194.1	30721	828.98	331.29
1998	1146.7	23527	827.91	294.09
1999	1136.58	31320	827.83	278.46
2000	2073.48	60827	827.84	279.01
2001	1645.79	38305	827.7	271.08
2002	1357.89	27990	827.7	309.88
2003	1497.04	32115	827.7	363.57
2004	1266.05	42334	827.68	409.72
2005	1161.06	31665	819.17	444.74
2006	2675.47	90469	797.18	603.46
2007	5261.56	460556	760.4	695.39
2008	1820.81	267113	694.51	871.57
2009	3277.14	533161	683.1	963.35

The Shanghai Stock Exchange Index, short for the Shanghai Stock Exchange Composite Stock Index, is a statistical indicator in China that reflects the overall trend of stocks listed on the Shanghai Stock Exchange. Here the closing price is chosen as the measure.

The stock transaction amount refers to the amount of the transaction between the buyer and the seller according to the relevant trading rules when buying (or selling) a stock in the process of stock trading.

rate at which the currency of one country is exchanged for the currency of another country, and is the price of one currency expressed in another currency. Here we choose to use the annual average price to reflect changes in the RMB exchange rate. The exchange rate of RMB reflects the value of the local currency of RMB. The higher the exchange rate, the lower the value of RMB, and the smaller the exchange rate, the higher the value of RMB. The price of gold refers to the dollar price of an ounce of gold.

3. Descriptive Statistics

To gain an overall understanding of the data, we perform a simple descriptive analysis of the data.

Table 2. Descriptive Statistics

	number of cases	minimum	maximum value	average value	standard deviation
Shanghai Composite Index	18	555.29	5261.56	1624.8911	1145.88776
Stock Turnover	18	683	533161	94883.83	158422.303
RMB Exchange Rate	18	551.46	861.87	779.6528	91.85260
Gold Price	18	71.08	963.35	443.0806	204.92588
Number of Valid Vases (in columns)	18				

It can be seen from the descriptive statistics chart that the maximum value of stock turnover is 55,316.1 billion yuan, and the minimum value is 68.3 billion yuan. The extreme value is large and the standard deviation is extremely large. Therefore, it can be concluded that the fluctuation of the stock turnover is not stable; the maximum value of the Shanghai Composite Index is 5261.56 and the minimum value is 552.29, the range is large, and the standard deviation is also large. It is guessed that the fluctuation of the Shanghai Composite Index and the stock turnover may be consistent.; The maximum value of the RMB exchange rate is 816.87 yuan, the minimum value is 551.46 yuan, the average value is 779.65 yuan, and the standard deviation is small. It can be seen that the RMB exchange rate has risen steadily from 1992 to 2009; the average value of gold prices is 443.08 US dollars per ounce, with a standard deviation of 204.93, it can be seen that the price of gold is rising steadily.

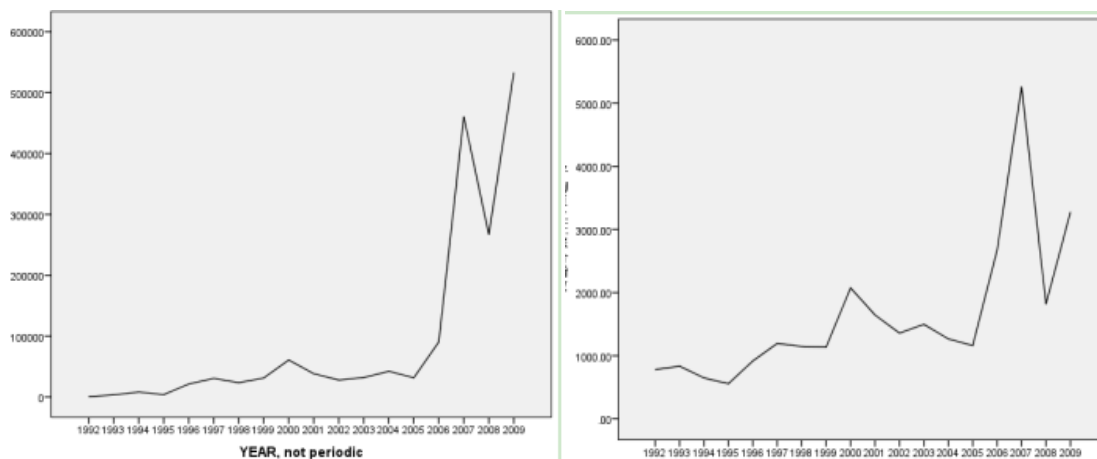


Figure 1. The average value of stock turnover

From the line chart with the average value of stock turnover, it can be seen that the stock turnover fluctuated steadily from 1992 to 2005; from 2005 to 2007, the stock turnover increased rapidly. From the line chart of the average Shanghai Composite Index, it can be seen that the Shanghai Composite Index fluctuated steadily from 1992 to 2005, had a small peak in 2000, increased rapidly from 2008 to 2007, and increased rapidly from 2007 to 2008. A rapid decline followed by a slower rise than before. The fluctuation trend of the stock turnover and the Shanghai Composite Index is roughly the same, so there is a relatively close relationship between the two.

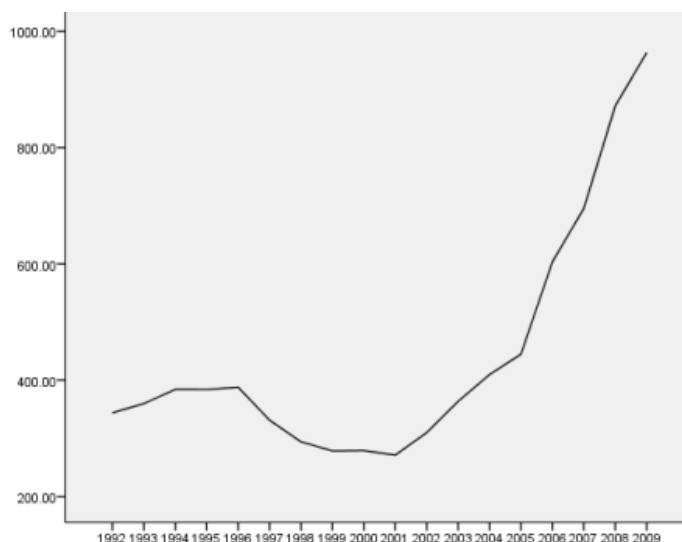


Figure 2. The line chart of the average gold price

From the line chart of the average gold price, it can be seen that the fluctuation of the gold price was relatively gentle from 1992 to 2005, and reached the lowest point in 2001. Since 2005, the gold price has grown rapidly.

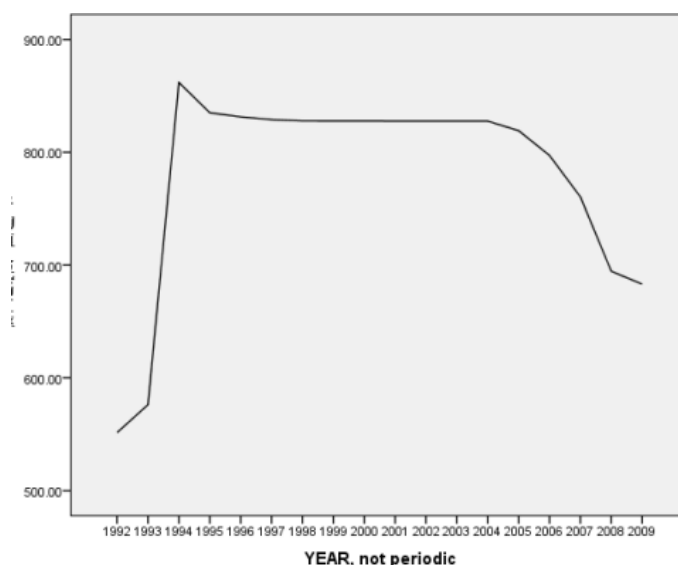


Figure 3. The line chart of the average RMB exchange rate

From the line chart of the average RMB exchange rate, it can be seen that the RMB exchange rate rose rapidly from 1993 to 1994, reached the highest value in 1994, and has been fluctuating

steadily since then, and has slowly declined since 2005. It can be seen from this that the RMB depreciated rapidly from 1993 to 1994, and then slowly appreciated.

4. Analysis Steps

First, add the time variable. As shown in the figure, because the selected data is annual data, so select years, and the data starts from 1992, so enter 1992 on the right.

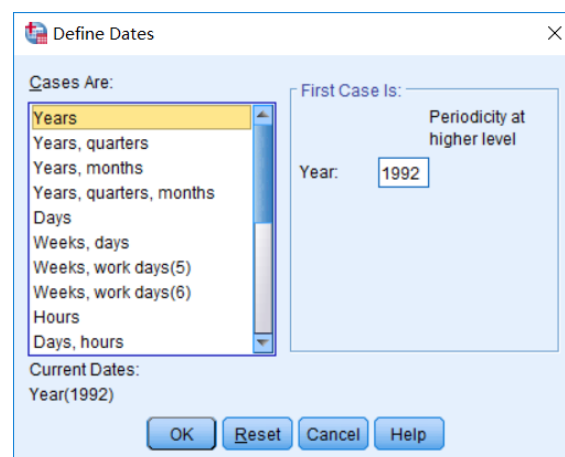


Figure 4. First steps

After that, the establishment of the ARIMA model is carried out, as shown in the figure.

The conclusion that can be drawn at this time, can be seen from the above figure, the gold price and the Shanghai Composite Index are highly significant, the RMB exchange rate and stock transaction amount are less significant, the t-test of the RMB exchange rate has not passed, and the significance is poor, so the independent variable of RMB exchange rate is removed. , and then build the ARIMA model.

The operation process is shown in the figure below At this time, the coefficient of each variable has a strong significance, the t-test is passed, and the model is established.

$$y = -209689.50 + 438.544x_1 + 67.859x_2$$

y – stock turnover

x_1 – gold price

x_2 – Shanghai Composite Index

Its economic significance is that under the condition that the gold price remains unchanged, for every 100% increase in the Shanghai Composite Index, the stock turnover will increase by 43.8544 billion yuan; under the condition that the Shanghai Composite Index remains unchanged, for every US\$1/ounce increase in the gold price, The stock turnover increased by 6.7859 billion yuan.

5. Conclusions

From the above analysis, it can be concluded that the change of stock turnover is closely related to the price of gold and the Shanghai Composite Index.

There is a positive correlation between the gold price and the stock transaction amount. Under the condition that the Shanghai Composite Index remains unchanged, for every US\$1/ounce increase in the gold price, the stock transaction amount increases by 6.7859 billion yuan. It can be seen that the price of gold has a positive impact on the stock transaction price, but the impact

is weak, it is also a positive correlation between the Shanghai Composite Index and the stock transaction amount. When the gold price remains unchanged, for every 100% increase in the Shanghai Composite Index, the stock transaction value increases by 43.8544 billion yuan, or in other words, when the gold price remains unchanged, for every 1 percentage point increase in the Shanghai Composite Index, the stock transaction value increases by 439 million yuan. It can be seen that the Shanghai Composite Index has a positive impact on the stock transaction price, and the impact is strong.

Investors can judge the changes in the stock turnover according to the recent changes in gold prices and the trend of the Shanghai Stock Exchange Index, and make reasonable investments.

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